

II. AMENDMENTS TO THE CLAIMS:

The following is a complete listing of claims, reflecting claim withdrawals made to give effect to the election of species.

1. (Original) A method of evaluating an undersaturated coalbed methane reservoir comprising the steps of:
 - a. accessing a well admitted to an undersaturated coalbed methane reservoir;
 - b. sampling formation water from said undersaturated coalbed methane reservoir;
 - c. conducting a test based on said formation water sample;
 - d. inductively quantifying a methane content characteristic of sorbed methane that is sorbed in a solid formation substance from said water sample; and
 - e. characterizing said coalbed methane reservoir based upon said inductively quantified methane content characteristic.
2. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of capturing substantially pure formation fluid.
3. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of assuring that said formation water sample is representative of fluid from said undersaturated coalbed methane reservoir.
4. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 3 wherein said step of assuring that said formation water sample is representative of fluid from said undersaturated coalbed methane reservoir comprises the step of producing at least a well pathway volume of fluid.

5. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 3 wherein said step of assuring that said formation water sample is representative of fluid from said undersaturated coalbed methane reservoir comprises the step of producing at least a well tubing volume of fluid.

Claims 6-7 (Canceled)

8. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 and further comprising the step of having a constant fluid production from said well at the time of said sampling.
9. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said well has a well bottom and wherein said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of collecting a single phase fluid from about said well bottom.
10. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of effecting only a small drawdown.
11. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 10 wherein said step of effecting only a small drawdown comprises the step of effecting only a small drawdown for a long period of time.
12. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 11 wherein said step of effecting only a small drawdown for a long period of time comprises the step of effecting only a small drawdown for a period of time selected from a group consisting of about one week, several days, about one day, longer than a traditional formation water sampling time.

13. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 10 wherein said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of sampling formation water after a period of nonproduction from said well.
14. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of sampling formation water until a gas-water ratio of said water is constant.
15. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of contained sampling said formation water.

Claims 16-26 (Canceled)

27. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of conducting a test based on said formation water sample comprises the step of on-site testing of said formation water.
28. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of conducting a test based on said formation water sample comprises the step of determining a gas-water ratio of said formation water.
29. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 28 wherein said step of determining a gas-water ratio of said formation water comprises the step of directly testing said gas-water ratio of said formation water.

30. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 29 wherein said step of directly testing said gas-water ratio of said formation water comprises the step of on-site testing of said formation water.
31. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 30 wherein said step of on-site testing of said formation water comprises the step of conducting a surface test of said formation water.
32. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 31 wherein said step of conducting a surface test of said formation water comprises the step of capturing gas from said undersaturated coalbed methane reservoir.
33. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 28 wherein said step of determining a gas-water ratio of said formation water comprises the step of testing the total gas content of said formation water.
34. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 28 wherein said step of determining a gas-water ratio of said formation water comprises the step of deducing said gas-water ratio of said formation water.
35. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 34 wherein said step of deducing said gas-water ratio of said formation water comprises the steps of:
 - a. measuring gas factors at a plurality of pressures; and
 - b. creating a curve based at least in part on said step of measuring gas factors at a plurality of pressures.

36. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of conducting a test based on said formation water sample comprises the step of determining a bubble point of said formation water.
37. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 36 wherein said step of determining a bubble point of said formation water comprises the step of directly testing said bubble point of said formation water.
38. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 37 wherein said step of directly testing said bubble point of said formation water comprises the step of on-site testing of said formation water.
39. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 38 wherein said step of directly testing said bubble point of said formation water comprises the step of conducting a surface test of said formation water.
40. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 39 wherein said step of directly testing said bubble point of said formation water comprises the step of testing said formation water during drilling.
41. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 39 wherein said step of directly testing said bubble point of said formation water comprises the steps of:
 - a. releasing pressure from a contained volume; and
 - b. observing a change resulting from said release of pressure.
42. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 41 wherein said step of sampling formation water from said

undersaturated coalbed methane reservoir comprises the step of contained sampling said formation water.

43. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 38 wherein said step of directly testing said bubble point of said formation water comprises the step of acoustically testing.
44. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 38 wherein said step of directly testing said bubble point of said formation water comprises the step of sensing a differential pressure drop.
45. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 36 wherein said step of inductively quantifying a methane content characteristic of sorbed methane that is sorbed in a solid formation substance from said water sample comprises the step of using a bubble point of said formation water to imply a critical desorption pressure of said undersaturated coalbed methane reservoir.
46. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 36 wherein said step of determining a bubble point of said formation water comprises the step of assuming all gas sorbed in said formation water is methane.
47. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 36 wherein said step of determining a bubble point of said formation water comprises the step of directly testing said bubble point of said formation water.
48. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 36 wherein said step of determining a bubble point of said

formation water comprises the step of deducing said bubble point of said formation water.

49. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 48 wherein said step of deducing said bubble point of said formation water comprises the steps of:
 - a. measuring gas factors at a plurality of pressures; and
 - b. creating a curve based at least in part on said step of measuring gas factors at a plurality of pressures.
50. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 48 wherein said step of deducing said bubble point of said formation water comprises the step of utilizing publicly available, predetermined data similar to data of the solubility of methane in water at various pressures for a given temperature.
51. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 48 wherein said step of deducing said bubble point of said formation water comprises the step of utilizing the mathematical functional relationship of solution gas-water ratio as a function of pressure with constants from publicly available predetermined data.
52. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 48 wherein said step of deducing said bubble point of said formation water comprises the step of combining functional foundations of a plurality of relationships to achieve a predicted relationship of bubble point to pressure of the desired pressure range applicable to the particular situation.
53. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 48 wherein said step of deducing said bubble point of said formation water comprises the steps of:

- a. extrapolating beyond measured data; and
 - b. utilizing an expected zero crossing point.
54. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 48 wherein said step of deducing said bubble point of said formation water comprises the step of ignoring corrections to data for temperatures of less than one hundred degrees Fahrenheit.
55. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 48 wherein said step of deducing said bubble point of said formation water comprises the step of ignoring corrections to data for other than fresh water.
56. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 48 wherein said step of deducing said bubble point of said formation water comprises the step of ignoring corrections to data for sorbed gas other than methane.
57. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 48 wherein said step of deducing said bubble point of said formation water comprises the step of utilizing publicly available, predetermined values for various temperature effects.
58. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 49 wherein said step of deducing said bubble point of said formation water further comprises the step of accomplishing a curve fitting function to a given set of data points.
59. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 58 wherein said step of accomplishing a curve fitting function to a given set of data points comprises the step of utilizing a cubic equation.

60. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 48 wherein said step of deducing said bubble point of said formation water comprises the steps of:
 - a. utilizing predetermined data having a lowest pressure at a pressure greater than that of interest; and
 - b. extrapolating from said lowest pressure for said predetermined data to a substantially zero value at a zero pressure to obtain data applicable to a pressure of interest.
61. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 60 wherein said step of utilizing predetermined data having a lowest pressure at a pressure greater than that of interest comprises the step of utilizing salinity-based predetermined data.

Claims 62-70 (Canceled)

71. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of conducting a test based on said formation water sample comprises the step of capturing gas from said undersaturated coalbed methane reservoir.
72. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 71 wherein said step of conducting a test based on said formation water sample comprises the step of separating gas and formation water from said well.
73. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 72 wherein said step of separating gas and formation water from said well comprises the step of utilizing a bubble pail apparatus on site.

74. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 72 wherein said step of separating gas and formation water from said well comprises the step of utilizing a separation barrel apparatus and an orifice well tester on site.

Claims 75-83 (Canceled)

84. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of inductively quantifying a methane content characteristic of sorbed methane that is sorbed in a solid formation substance from said water sample comprises the step of inferring a critical desorption pressure for a methane-containing solid from said step of conducting a test based on said formation water sample.
85. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of inductively quantifying a methane content characteristic of sorbed methane that is sorbed in a solid formation substance from said water sample comprises the step of utilizing an inverse gas-water ratio functional relationship.
86. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of characterizing said coalbed methane reservoir based upon said inductively quantified methane content characteristic comprises the step of determining a likely amount of methane production available from said well upon production.
87. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 86 wherein said step of determining a likely amount of methane production available from said well upon production comprises the step of utilizing an inferred critical desorption pressure for a solid within said undersaturated coalbed methane reservoir.

88. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 87 wherein said step of characterizing said coalbed methane reservoir based upon said inductively quantified methane content characteristic comprises the step of utilizing a saturated coalbed methane isotherm for said undersaturated coalbed methane reservoir.
89. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 88 wherein said step of utilizing a saturated coalbed methane isotherm for said undersaturated coalbed methane reservoir comprises the step of utilizing data representative of a Langmuir isotherm.

Claims 90-98 (Canceled)

99. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of characterizing said coalbed methane reservoir based upon said inductively quantified methane content characteristic comprises the step of estimating a dewatering value for said reservoir.
100. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 and further comprising the step of commercially producing methane from said well.
101. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of characterizing said coalbed methane reservoir based upon said inductively quantified methane content characteristic comprises the step of determining an approximate drop in reservoir pressure needed for gas to be produced from said well.
102. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of characterizing said coalbed methane

reservoir based upon said inductively quantified methane content characteristic comprises the step of estimating an economic factor for commercial production from said well.

103. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 102 wherein said step of estimating an economic factor for commercial production from said well comprises the step of prioritizing a plurality of wells based on economic considerations.
104. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of characterizing said coalbed methane reservoir based upon said inductively quantified methane content characteristic comprises the step of comparing said well to screening criterion.
105. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 104 wherein said step of comparing said well to a screening criterion comprises the step of comparing said well to a screening criterion selected from a group consisting of: a screening criterion based upon a reservoir pressure, a screening criterion based upon a permeability of said undersaturated coalbed methane reservoir, a screening criterion based upon the apparent critical desorption pressure of coal in said undersaturated coalbed methane reservoir, a screening criterion based upon the estimated dewatering needs of said undersaturated coalbed methane reservoir, a screening criterion based upon the degree of undersaturation of said undersaturated coalbed methane reservoir, a screening criterion based upon current prices of gas, a screening criterion based upon projected prices of gas, and a set value of gas content.
106. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 and further comprising the step of commercially producing methane from a well that had previously been deemed to be uneconomic.

Claims 107-112 (Canceled)

113. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 1 wherein said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of obtaining multiple samples of formation water from said well.

Claims 114-115 (Canceled)

116. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 113 and further comprising the step of achieving a constancy in said multiple samples of formation water from said well.

Claims 117-119 (Canceled)

120. (withdrawn) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 116 wherein said step of achieving a constancy in said comparing the results of said multiple similar tests through alteration of actions affecting said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of achieving a substantially constant gas-water ratio result for said formation water.
121. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 116 wherein said step of achieving a constancy in said comparing the results of said multiple similar tests through alteration of actions affecting said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of achieving a substantially constant bubble point result for said formation water.
122. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 116 wherein said step of achieving a constancy in said comparing

the results of said multiple similar tests through alteration of actions affecting said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of achieving a substantially constant critical desorption pressure result.

123. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 116 wherein said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of capturing both gas and water from said well.

Claim 124-144 (Canceled)

145. (Original) A method of evaluating an undersaturated coalbed methane reservoir comprising the steps of:
 - a. accessing an existing unproductive well admitted to a coalbed methane reservoir;
 - b. sampling formation water from said coalbed methane reservoir;
 - c. conducting a test based on said formation water sample; and
 - d. estimating an economic factor for commercial production from said well based upon said step of conducting a test based on said formation water sample.
146. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 145 wherein said step of accessing an existing unproductive well admitted to a coalbed methane reservoir comprises the step of accessing an existing water producing well admitted to a coalbed methane reservoir.
147. (Original) A method of evaluating an undersaturated coalbed methane reservoir as described in claim 145 wherein said step of estimating an economic factor for commercial production from said well based upon said step of conducting a test based on said formation water sample comprises the step of estimating when said well is likely to commercially produce methane.

Claims 148-151 (Canceled)

152. (Original) A dynamic method of surface sampling subsurface formation water comprising the steps of:
- a. accessing a well admitted to an undersaturated coalbed methane reservoir;
 - b. assuring that a formation water sample is representative of fluid from said undersaturated coalbed methane reservoir;
 - c. initially sampling formation water from said undersaturated coalbed methane reservoir;
 - d. conducting an initial test based on said initial formation water sample;
 - e. additionally sampling formation water from said undersaturated coalbed methane reservoir;
 - f. conducting a similar test based on said additional formation water sample;
 - g. comparing results of said initial sampling and said additional sampling; and
 - h. achieving a constancy in said comparing the results through alteration of actions affecting said step of sampling formation water from said undersaturated coalbed methane reservoir.
153. (Original) A dynamic method of surface sampling subsurface formation water as described in claim 152 wherein said step of achieving a constancy in said comparing the results of said multiple similar tests through alteration of actions affecting said step of sampling formation water from said undersaturated coalbed methane reservoir comprises the step of altering a production rate from said well.

Claims 154-172 (Canceled)